

IN THE CLAIMS

1. (currently amended) An electric motor comprising:

~~device functioning as an electric motor or actuator comprising:~~

~~a housing encapsulating a rotating member,~~

~~one or several arrangements for generating a magnetic field due to electrical current,~~

~~a displaceable shaft at least partly having exterior grooves,~~

~~said rotating member having at least a portion with inner grooves substantially corresponding to grooves on said shaft,~~

~~a carrying sleeve being arranged to be provided on an outer surface of said rotating member substantially perpendicular to extension direction of said grooves for interaction with said arrangement and rotating said rotating member~~

~~that said sleeve has an interior shape corresponding to an outer surface of the rotating member and an outer surface comprising portions for receiving a number of magnetic elements, said portions being arranged as flat portion and/or grooves for receiving said magnetic elements.~~

an input for receiving an electrical signal from a control unit;

~~A device functioning as an electric motor or actuator comprising:~~

~~-a housing encapsulating a rotating member, said rotating member comprising a ball nut portion; ;~~
~~-one or several arrangements for generating a magnetic field due with respect to said electrical currentssignal; ;~~
~~-a displaceable shaft comprising at least partly being arranged as a ball screw portion and a ball return portion; ;~~
~~a carrying sleeve comprising, on its outer surface, said rotating member having a portion being provided as a ball nut, magnetic elements, said carrying sleeve being arranged on an outer surface of a carrying sleeve arrangedprovided -on said rotating member substantially parallel with an extension direction of said shaft for interaction with said one or several arrangements for generating a magnetic fieldarrangement and rotating said ball nut; ; and~~

wherein

said one or several arrangements for generating a magnetic field are configured to generate a magnetic field when a current corresponding to said electrical signal flows through said arrangements and to interact with said magnetic elements to produce a torque, which rotates the sleeve and the ball nut forcing said shaft to displace linearly.

~~characterised in~~

~~that said sleeve has an interior shape corresponding to an outer surface of the rotating member and an outer surface comprising portions for receiving a number of magnetic elements, said portions being arranged as flat portion and/or grooves for receiving said magnetic elements.~~

2--9. (cancelled)

10. (currently amended) The arrangement of claim 91, wherein said sleeve is made of a laminated material.

11. (cancelled)

12 (currently amended) The arrangement of claim 11, wherein said ball return comprises a ~~notch~~notch arranged diagonally on the ball nut, a preload system, a return cap and a wiper arranged between the return cap and the shaft, grooves or ball tracks in which the balls run.

13. (currently amended) The arrangement of claim 12, wherein said ball return comprises a single ~~liner~~linear screw in which a notch forces balls passing through the notch to change track to the adjacent track.

14. (currently amended) The arrangement of claim 12, wherein said ball return comprises a ball nut having multiple linear ball returns.

15. (currently amended) The arrangement of claim 121, wherein said ball return comprises a single- or multi liner system, in which the balls are lead back after each circulation around the shaft and the liner picks the balls out of a ball track and guides them with ~~its~~a path over the portion between the ball tracks of the shaft.

16. (currently amended) The arrangement of claim 91, wherein ~~the shaft~~said ball return is provided with a return cap having a return channel, wherein said return cap system picks the balls up at one end of the nut and lead them back, through a hole in the nut, to the other side.

17. (currently amended) The arrangement of claim 12, wherein said ball return comprises a liner return placed in the shaft and the balls are lead through ~~its~~a path over a portion between the ball tracks of the nut

18. (cancelled)

19. (currently amended) The arrangement of claim 91, wherein said housing is at least partly filled with a lubrication agent.

20. (currently amended) A vehicle having steering wheels and including an ~~actuator~~electrical motor comprising:

an input for receiving an electrical signal from a control unit of said vehicle;

a housing encapsulating a rotating member, said rotating member comprising a ball nut portion;

one or several arrangements for generating a magnetic field with respect to said electrical signal;

a displaceable shaft at each end connected to said steering wheels and comprising a ball screw portion and a ball return portion;

a carrying sleeve comprising, on its outer surface, magnetic elements, said carrying sleeve being provided on said rotating member substantially parallel with an extension direction of said shaft for interaction with said one or

several arrangements for generating a magnetic field and rotating said ball nut; and

wherein

said one or several arrangements for generating a magnetic field are configured to generate a magnetic field when a current corresponding to said electrical signal flows through said arrangements and to interact with said magnetic elements to produce a torque, which rotates the sleeve and the ball nut forcing said shaft to displace linearly to manoeuvre maneuver said steering wheels.

~~— a housing encapsulating a rotating member,~~

~~— one or several arrangements for generating a magnetic field due to electrical current,~~

~~— a displaceable shaft at least partly having exterior grooves,~~

~~— said rotating member having a portion with inner grooves corresponding to grooves on said shaft,~~

~~— a carrying sleeve having magnetic elements arranged on an outer surface of said sleeve, being arranged on said rotating member substantially parallel with extension of said grooves for interaction with said arrangement and rotating said rotating member~~

~~characterised in~~

~~that said sleeve has an interior shape corresponding to an outer surface of the rotating member and an outer surface comprising portions for receiving a number of magnetic elements, said portions being arranged as flat portion and/or grooves for receiving said magnetic elements.~~

21. (currently amended) A method of actuating and object using a device functioning as an electric motor ~~or actuator~~, comprising:

- a housing encapsulating a rotating member~~;~~i;
- one or several arrangements for generating a magnetic field due to an electrical current corresponding to a control signal~~;~~i;
- a displaceable shaft at least partly being arranged as a ball ~~screw~~return~~;~~i;
- said rotating member having a portion being provided as a ball nut~~;~~: and

wherein the method comprising includes the steps of:

arranging magnetic elements on an outer surface of said rotating member substantially parallel with an extension direction of said shaft for interaction with said arrangement and rotating said ball nut, and energizing said one or several arrangements for generating a magnetic field ~~stators~~ to rotate said rotating member and transforming ~~station of~~ said rotating member to a linear movement.

22. (cancelled)